

**WHAT IS CLAIMED IS:**

1        1. A semiconductor interconnection system, comprising:  
2              a semiconductor die;  
3              first and second conductive contacts, said first conductive contact coupled to a  
4              surface of said semiconductor die, and said second conductive contact coupled to an external  
5              structure or die;  
6              a silver epoxy bond interposed between said first and second conductive contacts,  
7              said epoxy bond providing electrical and mechanical interconnection between said  
8              semiconductor die and said external structure; and  
9              an insulating island configured to prevent migration of silver from said silver epoxy  
10          bond to said semiconductor die through said first conductive contact.

1        2. The system of claim 1, wherein said semiconductor die is a photodetector.

1        3. The system of claim 2, wherein said photodetector is a p-i-n photodiode.

1        4. The system of claim 1, wherein said insulating island comprises a layer of  
2              oxide.

1        5. The system of claim 1, further comprising:  
2              a conductive electrode heavily doped with p-type material at the surface of said  
3              semiconductor die to provide electrical connection between said semiconductor die and said  
4              external structure.

1        6. The system of claim 5, further comprising an insulator/metal bonding  
2              structure disposed above said insulating island, said insulator/metal bonding island providing  
3              direct contact between the silver epoxy bond and the conductive electrode, thereby providing  
4              required electrical connection between said semiconductor die and said external structure.

1        7. The system of claim 1, wherein said semiconductor die is silicon and the  
2              insulating island is thermally grown silicon dioxide.

1        8. The system of claim 1, wherein said insulating island provides reduction in  
2              transmission of mechanical stress from said silver epoxy bond into the semiconductor die.

1           9. A semiconductor flip-chip, comprising:  
2           a semiconductor die having a plurality of conductive contacts;  
3           a plurality of epoxy bonds having a metallic component, said epoxy bonds configured  
4           to provide interconnection between said semiconductor die and an external structure, said  
5           plurality of epoxy bonds selectively applied to said plurality of conductive contacts on said  
6           semiconductor die and corresponding conductive contacts on the external structure; and  
7           an array of insulating islands coupled to said plurality of conductive contacts, said  
8           insulating islands configured to prevent migration of said metallic substance from said  
9           plurality of epoxy bonds to said semiconductor die through said plurality of conductive  
10          contacts.

1           10. The flip-chip of claim 9, wherein said metallic substance is silver.

1           11. The flip-chip of claim 9, wherein said semiconductor die is a semiconductor  
2           illumination detector chip.

1           12. The flip-chip of claim 9, wherein said plurality of conductive contacts on said  
2           semiconductor die forms connections to an array of photodiode pixels.

1           13. The flip-chip of claim 11, wherein said array of insulating islands prevents  
2           degradation of low reverse-bias leakage currents in said array of photodiode pixels.

1        14. A method of manufacturing a flip-chip interconnection device, comprising:  
2                providing an array of insulating islands on a semiconductor die;  
3                applying a plurality of metal contacts over said array of insulating islands; and  
4                selectively depositing an array of epoxy bonds on said plurality of metal contacts,  
5        where said providing said array of insulating islands prevents migration of metallic substance  
6        in said array of epoxy bonds into said semiconductor die.

1        15. The method of claim 14, further comprising:  
2                aligning said array of epoxy bonds on top of respective metal contacts on an external  
3        structure; and  
4                bonding said semiconductor die to said external structure.

1        16. The method of claim 14, wherein said providing said array of insulating  
2        islands includes depositing a layer of thermally grown silicon dioxide.

1        17. The method of claim 14, wherein said applying said plurality of metal  
2        contacts provides an array of insulator/metal bonding islands disposed on top of said array of  
3        insulating islands, said array of insulator/metal bonding islands operating to provide direct  
4        electrical contact between the array of epoxy bonds and the semiconductor die.

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